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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Effects of absorbing aerosols in cloudy skies: a satellite study over the Atlantic Ocean" *by* K. Peters et al.

Anonymous Referee #1

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Pg 20854 Line 13, 16. Should not use symbols in abstract, use the name of the parameter. Line 17. Increasing amount of absorbing aerosols? How is the amount of absorbing aerosols defined?

Pg 20855 Line 13, Provide reference for statement quoting 0.8 as SSA lower limit. Line 23, '. . .surface albedo and aerosol single scattering albedo.'

Pg 20856 Line 6 insert 'of the aerosol layer in the absence of clouds' after 'negative TOD DRF' Line 19 use 'long timescales', instead of 'long temporal timescales' (redundant) Line 23, what is the reference wavelength for alpha?

Pg 20859 Line 13, What determines the variability of the spatial resolution? Is the spatial resolution identical for the three (UV1, UV2, and VIS) OMI sensors?

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Line 14, What aerosol properties are derived from OMI in cloudy scenes? The Aerosol Index is not an aerosol property.

Line 24, Provide an adequate reference for the actual OMAERUV product used in the analysis.

Line 25, Which AI product is used in the analysis? According to the wavelength definition the authors seem to be referring to the OMAERUV product. Mention the full product. The correct wavelengths are 354 and 388 and the most appropriate reference is Torres et al, [2007].

Pg 20860 Line 7. Does OMI detect aerosols in clouds? If true provide reference for this statement. Line 17? According to what 'theory' should the UV-AI be close to unity for very low AOD values? Provide reference for this statement.

Pg 20861 Line 25, which two years?

Pg 20862 Line 4., In the context of this analysis one can not use 'absorbing aerosol' in a generic way to include desert dust absorption and black carbon absorption. Aerosol absorption is a wavelength dependent process that has a very different effect on the overall energy content in the range 0.3-5 microns depending on the aerosol type. For biomass burning aerosols the broadband absorption may be significant, but for dust it is not. Line 18. What MODIS cloud product is used to characterize a scene as overcast? MODIS cloud properties are affected by the presence of absorbing aerosols above the clouds (Wilcox et, al 2009). The effect is different for dust aerosols (reduced absorption in the vis-near IR) than for biomass burning aerosols (strong absorption in the entire vis near-IR). How does the wavelength dependent effect of aerosol absorption above clouds affect the criteria for the threshold used to identify overcast scenes? Line 22, The assumption that aerosol characteristics are similar on a similar timescale is hard to justify. The area TNEA is affected by the presence of both dust and biomass burning aerosols from November through early march. The rest of the year the aerosol load is predominantly dust. The most northern part of TSEA is also affect by the presence of

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dust and biomass burning mixtures. Line 24. The UV-AI can certainly be used to identify the presence of UV-absorbing aerosols. In terms of what parameter in the aerosol characterized using the UV-AI? The magnitude of the UV-AI depends on multiple parameters (AOD, height, particle size) as Shown in Herman et al (1997). The magnitude of the AI is also affected when aerosols are above a highly reflective background as clouds, and the effect is different depending on the aerosol types [Torres et al, 1998].

Line 25. How is the absorbing aerosol mass defined? The MODIS AOD is probably related to the absorbing aerosol mass in the case of biomass burning aerosols since BC absorbs in the visible. In the case of dust one cannot assume that the MODIS AOD is related to aerosol absorption mass, dust absorption is significantly lower in the visible.

Pg 20863

Line 10. The 0.7 threshold is too simplistic. The 0.7 value is adequate for cloud-free scenes. For aerosol above clouds a different threshold is needed.

Pg 20864. Line 9 should read 'TSEA and TNEA'

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 20853, 2009.